

Amendment under 37 CFR § 1.111
Application No. 10/622,614
Attorney Docket No. 030877

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions of claims in the application.

1. (Currently amended): A semiconductor device comprising:

a first insulating film formed over a substrate;

a first interconnection buried in at least a surface side of the first insulating film, the first interconnection having a pattern which is bent at a right angle;

a second insulating film formed on the first insulating film with the first interconnection buried in, and including a groove-shaped via-hole formed in a region above the first interconnection, the groove-shaped via-hole having a pattern which is formed along an extending direction of the first interconnection and is bent at a right angle; [[and]]

a first buried conductor filled in the groove-shaped via-hole; and

a second buried conductor buried in a hole-shaped via-hole formed in the second insulating film on the first interconnection, a width of the groove-shaped via-hole being 20 - 140% of a width of the hole-shaped via-hole.

2. (Withdrawn): A semiconductor device according to claim 1, wherein

a width at a bent portion of the pattern of the groove-shaped via-hole is not more than a width at a straight portion thereof.

3. (Withdrawn): A semiconductor device according to claim 1, wherein
the groove-shaped via-hole is bent at a bent portion of the pattern a plurality of times at a
larger angle than 90°.

4. (Withdrawn): A semiconductor device according to claim 3, wherein
the groove-shaped via-hole is bent at the bent portion of the pattern twice each at 135°.

5. (Withdrawn): A semiconductor device according to claim 3, wherein
a pattern of the first interconnection is bent in the same way as the pattern of the groove-
shaped via-hole.

6. (Withdrawn): A semiconductor device according to claim 4, wherein
a pattern of the first interconnection is bent in the same way as the pattern of the groove-
shaped via-hole.

7. (Withdrawn): A semiconductor device comprising:
a first insulating film formed over a substrate;
a first interconnection buried in at least a surface side of the first insulating film, the first
interconnection having a pattern which is bent at a right angle;

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a second insulating film formed on the first insulating film with the first interconnection buried in, and including a groove-shaped via-hole formed in a region above the first interconnection; and

a first buried conductor filled in the groove-shaped via-hole,
the groove-shaped via-hole being interrupted at a corner of the pattern of the first interconnection.

8. (Cancelled)

9. (Withdrawn): A semiconductor device according to claim 7, further comprising:
a second buried conductor buried in a hole-shaped via-hole formed in the second insulating film on the first interconnection.

10. (Cancelled)

11. (Withdrawn): A semiconductor device according to claim 9, wherein
a width of the groove-shaped via-hole is 20 - 140% of a width of the hole-shaped via-hole.

12. (Currently amended): A semiconductor device ~~according to claim 8, wherein~~
comprising:
a first insulating film formed over a substrate;
a first interconnection buried in at least a surface side of the first insulating film, the first
interconnection having a pattern which is bent at right angle;
a second insulating film formed on the first insulating film with the first interconnection
buried in, and including a groove-shaped via-hole formed in a region above the first
interconnection, the groove-shaped via hole having a pattern which is formed along an extending
direction of the first interconnection and is bent at a right angle;
a first buried conductor filled in the groove-shaped via-hole; and
a second buried conductor buried in a hole-shaped via-hole formed in the second
insulating film on the first interconnection, a width of the groove-shaped via-hole [is] being not
more than a width of the hole-shaped via-hole.

13. (Withdrawn): A semiconductor device according to claim 9, wherein
a width of the groove-shaped via-hole is not more than a width of the hole-shaped via-
hole.

14. (Withdrawn): A semiconductor device according to claim 1, including a plurality of
groove-shaped via-holes arrange adjacent to each other formed in the second insulating film,

at least a part of the grooves being formed of the groove-shaped via-hole.

15. (Withdrawn): A semiconductor device according to claim 7, including a plurality of groove-shaped via-holes arranged adjacent to each other formed in the second insulating film, at least a part of the grooves being formed of the groove-shaped via-hole.

16. (Withdrawn): A semiconductor device according to claim 14, wherein the groove-shaped via-hole is formed at the outermost of the groove-shaped via pattern.

17. (Withdrawn): A semiconductor device according to claim 15, wherein the groove-shaped via-hole is formed at the outermost of the groove-shaped via pattern.

18. (Withdrawn): A semiconductor device according to claim 14, wherein the groove-shaped via pattern is formed on one and the same pattern of the first interconnection.

19. (Withdrawn): A semiconductor device according to claim 15, wherein the groove-shaped via pattern is formed on one and the same pattern of the first interconnection.

20. (Cancelled)

21. (Withdrawn): A semiconductor device according to claim 7, wherein
the groove-shaped via-hole is formed along an extending direction of the first
interconnection.

22. (Previously presented): A semiconductor device comprising:
a conducting layer buried in a surface side of a substrate the conducting layer having a
pattern which is bent at a right angle;
an insulating film formed on the substrate with the conducting layer buried in, and
including a groove-shaped via-hole formed in a region above the conducting layer, the via-hole
having a pattern which is formed along an extending direction of the conducting layer and is
bent at a right angle; and
a buried conductor filled in the groove-shaped via-hole.

23. (Withdrawn): A semiconductor device according to claim 7, wherein
the first interconnection buried in the first insulating film is a conducting layer buried in
the substrate.

24. (Original): A semiconductor device according to claim 1, wherein

the first interconnection is formed of a conductor which is mainly formed of copper.

25. (Withdrawn): A semiconductor device according to claim 7, wherein
the first interconnection is formed of a conductor which is mainly formed of copper.

26. (Original): A semiconductor device according to claim 1, further comprising:
a second interconnection formed on the second insulating film and formed of a conductor
which is mainly formed of aluminum.

27. (Withdrawn): A semiconductor device according to claim 7, further comprising:
a second interconnection formed on the second insulating film and formed of a conductor
which is mainly formed of aluminum.

28. (Original): A semiconductor device according to claim 26, wherein
the first interconnection and the second interconnection have the same pattern.

29. (Withdrawn): A semiconductor device according to claim 27, wherein
the first interconnection and the second interconnection have the same pattern.

30. (Withdrawn): A semiconductor device comprising:

a first and a second impurity diffused regions formed in a semiconductor substrate;

a first insulating film formed on the semiconductor substrate, and including a groove-shaped via-hole having a pattern bent at a right angle formed in a region above the first impurity diffused region and a hole-shaped via-hole formed in a region above the second impurity diffused region;

a first buried conductor buried in the groove-shaped via-hole; and

a second buried conductor buried in the hole-shaped via-hole,

a width of the groove-shaped via-hole being 20 - 140% of a width of the hole-shaped via-hole.

31. (Original): A semiconductor device according to claim 1, wherein

the first buried conductor and the second buried conductor are formed of a conductor mainly formed of tungsten.

32. (Withdrawn): A semiconductor device according to claim 7, wherein

the first buried conductor and the second buried conductor are formed of a conductor mainly formed of tungsten.

33. (Withdrawn): A semiconductor device according to claim 30, wherein

the first buried conductor and the second buried conductor are formed of a conductor mainly formed of tungsten.

34. (Previously presented): A semiconductor device according to claim 1, wherein the second insulating film is a layer film of a silicon nitride film and a silicon oxide film.

35. (Withdrawn): A semiconductor device according to claim 7, wherein the second insulating film is a layer film of a silicon nitride film and a silicon oxide film or a layer film of an SiC film and a silicon oxide film.

36. (Withdrawn): A semiconductor device according to claim 30, wherein the second insulating film is a layer film of a silicon nitride film and a silicon oxide film or a layer film of an SiC film and a silicon oxide film.

37. (Previously presented): A semiconductor device according to claim 1, wherein the first insulating film is a layer film of a silicon nitride film and a silicon oxide film.

38. (Withdrawn): A semiconductor device according to claim 7, wherein the first insulating film is a layer film of a silicon nitride film and a silicon oxide film or a layer film of an SiC film and an SiOC film.

39. (Withdrawn): A semiconductor device according to claim 30, wherein
the first insulating film is a layer film of a silicon nitride film and a silicon oxide film or a
layer film of an SiC film and an SiOC film.

40. (Withdrawn): A method for fabricating a semiconductor device including a first
insulating film formed over a substrate, a first interconnection buried in at least a surface side of
the first insulating film, and a second insulating film formed on the first insulating film with the
first interconnection buried in and including a groove-shaped via-hole and a hole-shaped via-hole
which are opened on the first interconnection,

in forming the groove-shaped via-hole and the hole-shaped via-hole in the second
insulating film, a mask pattern having a design width of the groove-shaped via-hole smaller than
a design width of the hole-shaped via-hole being used to form the groove-shaped via-hole and the
hole-shaped via-hole.

41. (Withdrawn): A method for fabricating a semiconductor device including a first
insulating film formed over a substrate, a first interconnection buried in at least the surface side
of the first insulating film, a second insulating film formed on the first insulating film with the
first interconnection buried in and including a groove-shaped via-hole and a hole-shaped via-hole

which are opened on the first interconnection, and a buried conductor buried in the groove-shaped via-hole and the hole-shaped via-hole,

in forming the buried conductor, a deposited film thickness of a conducting film to be the buried conductor being set in consideration of a maximum width of the groove-shaped via-hole, so that the groove-shaped via-hole and the hole-shaped via-hole are filled by the buried conductor.

42. (Previously presented) A semiconductor device according to claim 1, wherein the second insulating film is a layer film of an SiC film and a silicon oxide film.

43. (Previously presented) A semiconductor device according to claim 1, wherein the first insulating film is a layer film of an SiC film and an SiOC film.

44. (Previously presented) A semiconductor device according to claim 1, wherein the first buried conductor completely fills the groove-shaped via-hole without any voids.

45. (New): A semiconductor device comprising:
a conducting layer buried in a surface side of a substrate, the conducting layer having a pattern which is bent at a right angle;

an insulating film formed on the substrate with the conducting layer buried in, and including a groove-shaped via-hole formed in a region above the conducting layer, the via-hole having a pattern which is formed along an extending direction of the conducting layer and is bent at a right angle;

a first buried conductor filled in the groove-shaped via-hole; and

a second buried conductor buried in a hole-shaped via-hole formed in the insulating film, a width of the groove-shaped via-hole being not more than a width of the hole-shaped via-hole.

46. (New): A semiconductor device according to claim 12, wherein the first interconnection is formed of a conductor which is mainly formed of copper.

47. (New): A semiconductor device according to claim 12, further comprising:
a second interconnection formed on the second insulating film and formed of a conductor which is mainly formed of aluminum.

48. (New): A semiconductor device according to claim 47, wherein the first interconnection and the second interconnection have the same pattern.

49. (New): A semiconductor device according to claim 12, wherein

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the first buried conductor and the second buried conductor are formed of a conductor mainly formed of tungsten.

50. (New): A semiconductor device according to claim 22, wherein
the first buried conductor and the second buried conductor are formed of a conductor mainly formed of tungsten.

51. (New): A semiconductor device according to claim 45, wherein
the first buried conductor and the second buried conductor are formed of a conductor mainly formed of tungsten.